**NATIONAL ECOSYSTEM ASSESSMENT PROJECT**

Ministry of Environment and Royal University of Phnom Penh

-----

**Preface**

**Acknowledgements**

**Table of content**

**Abbreviations**

**Executive summary**

**Chapter 1: Setting the Scene**

**By: Dr. THUON Try and Dr. SEAK Sophat**

# Rationale of NEA assessment

Focus on the socio-economic context, global issues including COVID-19, the implementation of Sustainable Development Goals

## Objectives

In this section, we also include six policy questions links to the SDGs and post 2020 Global Biodiversity Framework.

## Scope of NEA assessment

geographical maps, themes, and areas of emphasis. This can be taken from the section 3.4 in scoping documents: 3 mains areas, the eastern plan, the northern parts of Tonle Sap Lake, and coastal and marine areas.

# Brief of NEA assessment methodology and approaches (2, 3 4 and 5 should be in one section, section 4)

# Adoption of IPBES methodology into Cambodia context

# Conducting data collections and surveys based on the requirements

## Compilation of secondary and primary data on ecosystem structures, processes, functions, their drivers, legal and institutional frameworks, knowledge gaps, and socio-economic importance

## Validation of data/information collected from reviewing literatures and field surveys

# Brief key methodologies by each chapter (chapters 2 to 6)

Assessment framework of drivers of biodiversity and ecosystem changes: Schematic DPSIR framework analysis (National stocktaking analysis), Methods for scenarios development based on IPBES, including exploratory scenarios (Assess drivers of changes based on factors, size of impact, speed, and capacity to response (institutional management), land use and land cover changes, and mapping timeline of ecological change & social-economic change – Methods to assess the pollination services. We also include the conceptual framework, key principles, full NEA process + Integration of traditional knowledge; uncertainty and gaps in knowledge)-also see scoping document section 3: methodological approach.

***Note****: this section is depending on the inputs (methodology) from individual chapter.*

# Organization of the report (by Chapter) (this is section 5. It can be introduced by a short para articulated around the importance of NEA. Structure of the NEA report (just brief introduction of chapter 2 to 6)

# References

**Chapter 2: Biodiversity contributions to Cambodia’s socioeconomic development and the wellbeing of its populations**

By: Dr. CHHIN Sophea, H.E Dr. YOEU Asikin, Dr. SOR Ratha, Dr. FUREY Neil, DONAL Yeang, Mr. CHUN Nimul

# Introduction

*[This chapter will compile the value of biodiversity and its contributions to the well-being of the Cambodian people as well as to the National Sustainable Development Goals. are located]*

## Rationale

## Scope of chapter

# Methodology

[*We will use the availability IPBES methodologies adopted by the Asia-Pacific Regional Assessment described in section 1.3. These include the following: (i) The use of the IPBES ~~Conceptual Framework to highlight how biodiversity and ecosystems services contribute to the economy, livelihoods, food security and good quality of life for human being~~*.]

* 1. Conceptual framework *(to highlight how biodiversity and ecosystems services contribute to the economy, livelihoods, food security and good quality of life for human being)*
	2. Measurement of value of ecosystem services (TEV)

# Spatial and temporal trends of valuation studies in Cambodia

## Eastern Plain

## Tonle Sap region

## Mountainous region

## Coastal and marine areas

# Value estimates by ecosystem types and ecosystem services

*[This section will valuate the four main services provided by ecosystems into economic values based on existing baseline value in Cambodia and may discover around.]*

## Provisioning services:

### Genetic resources

### Water

### Food

### Good air quality

### Fibber

### Timber

### Materials for construction

### Ornament use

### 4.1.6 Energy: fuelwood, biofuel? biogas? Also timber, materials for construction and artisanal use

### Medicine: biochemicals and compounds (e.g. latex)

## Regulating services:

### Carbon sequestration

### Water filtration and purification

### Soil erosion control

### Flood control

### Storm protection

### Soil nutrient protection

### Pollination

* Dependence ratio estimates of the economic benefits of pollination (and consumer or producer surplus if the right data is available)
* Note on the costs incurred by beekeepers when they use crops (and a note that this, along with the lack of information on the importance of wild pollinators to crops, makes it inappropriate to use replacement costs)
* Knowledge gaps (price elasticities and value chains)

### Climate regulations

## Cultural services:

### Education and environmental knowledge

### Recreation and ecotourism

### Spiritual premises

## Supporting services:

### Nutrient recycling

### Habitat provision

### Primary productions: photosynthesis

### Water cycling

# Valorisation of biodiversity and ecosystem services

*[This section will highlight the crucial value of ecosystems that are contributing to priority sectors in Cambodia such as agriculture, tourism, health, education… Cambodia designed a huge Protected Areas, so we will also highlight the contribution of of PAs in economic development and human wellbeing]*

## Agriculture:

### Irrigation (project on irrigation)

### Raw materials (yield based on land area)

### Pest control (based on projects)

### Pollination

General awareness of pollination for Cambodia people

Current pollination status in agriculture – list of pollinated crops

Importance of pollinators for supporting employment through value chains (example of longan value chain)

Importance of pollinator dependent crops to diets (we don’t know, but we can give examples of this in other countries to show how important it is to look at in the future).

Number of beekeepers and beehives (and trends in them)

Trends of pollination

Possible solution

### Agri-industry (including flowers?)

## Industry:

### Mine

### Energy: wind, water

### Food processing: packaging and production of juice, fermented food

### Handicraft and textile

## Tourism: recreation

### Ecotourism: Entry fees, guide, tourist fees

### Agro-tourism

### Homestay

### Religious meditation

## Health:

### Beauty and cosmetics (ABS)

### Traditional medicine

### Natural treatment (fresh air and open space)

### Stress release

### Zoonotic

## Education:

### Environmental awareness

### Knowledge

### Outdoor experiment and library

### Research: gene and seed bank, conservation

# Conclusion

### Key findings: nature’s contributions to people and quality of life

### Emerging issues and opportunities

### Challenges and implications

# References

**Chapter 3: Status, Trends and Future Dynamics of Biodiversity and Ecosystem Services**

**Authors: Dr. SPOANN Vin1, Mr. PHAT Chandara2, Dr. SOR Ratha2**

**and Dr. Ith Saveng**

\* 1 Lead Author: Faculty of Development Studies, Royal University of Phnom Penh

\* 2 Co-author: Royal University of Phnom Penh

# Introduction

## Rationale

## Scope of chapter

# Methods of the assessment

# Current status of biodiversity and ecosystem services in Cambodia

## Current status of biodiversity (what numbers, situation, distribution in the ecoregions)

### Status of genetic diversity

### Status of species diversity

### Status of ecosystem diversity

Note: In this section, the comparisons between the ecoregions will be made e.g., where it will be more efficient to protect a given service.

## Current status of ecosystems services by eco-regions (composition and status by region, situation) [authors will provide figures and information on ecosystems and ecosystem services in particular ecoregions].

### Eastern Plain

### Provisioning

#### Regulating

#### Cultural

#### Supporting

### Tonle Sap region

#### Provisioning

#### Regulating

#### Cultural

#### Supporting

### Mountainous region

#### Provisioning

#### Regulating

#### Cultural

#### Supporting

### Coastal and marine areas

#### Provisioning

#### Regulating

#### Cultural

#### Supporting

# Trends and future dynamics of biodiversity and ecosystem services in Cambodia (past, present and future)

Note: Before starting the past, trend and future dynamics, in this section, we will briefly mention about the drivers of changes.

## Past trends and future dynamics of biodiversity

### Key species

### Essential genetic variation/diversity

### Ecosystem Diversity

4.1.4 Pollination

## Trends in ecosystems services

### Eastern plain

#### Trends in ecosystem services (land use change overtime and trend) [this section will describe the significant trends of provisioning, regulating, cultural, and supporting services in eastern plain].

#### Future dynamics of ecosystems services [the analysis of future dynamic of changes base on trends of ecosystem services in section 4.2.1]

### Tonle Sap region

#### Trends of ecosystem services [this section will describe the significant trends of provisioning, regulating, cultural, and supporting services in Tonle Sap Region]

#### Future dynamic change of ecosystems services [the analysis of future dynamic of changes base on trends of ecosystem services in section 4.2.2]

### Mountainous region

#### Trends of ecosystem services [this section will describe the significant trends of provisioning, regulating, cultural, and supporting services in Mountainous Region]

#### Future dynamic change of ecosystems services [the analysis of future dynamic of changes base on trends of ecosystem services in section 4.2.3]

### Coastal and marine areas

#### Trends of ecosystem services this section will describe the significant trends of provisioning, regulating, cultural, and supporting services in Coastal and Marine Areas]

#### Future dynamic change of ecosystems services [the analysis of future dynamic of changes base on trends of ecosystem services in section 4.2.4]

## 4.3 Consequences of the Changes in Status of Biodiversity and Ecosystem Service/Contributions to Peoples

# Conclusions

In this section, summary will be based on:

1. Key findings
2. Emerging issues and opportunities
3. Challenges and implications

# References

**Chapter 4: Direct and Indirect Drivers of Change Affecting the Provision of Ecosystem Services Supporting Socio-Economic Development and Human Well-being**

**Author: Phanith CHOU\*1 & Vibol SAN2,**

***Mr. Seng Rathea***

***\*1 Lead author, Faculty of Development Studies, Royal University of Phnom Penh,*** ***chou.phanith@rupp.edu.kh***

***2 Co-author, Faculty of Development Studies, Royal University of Phnom Penh,*** ***san.vibol@rupp.edu.kh***

**Executive Summary of the Chapter**

* 1. **Introduction**
		1. Rationale
		2. Scope of the chapter
	2. **Methods**
		1. Assessment framework of drivers of biodiversity and ecosystem change
			1. Schematic of DPSIR framework analysis
				+ National stocktaking analysis
			2. Exploratory scenarios
				+ Assess driver of changes base on factors, size of impact, speed, and capacity to response (institutional management)
				+ Land use and land cover changes
				+ Mapping timeline of ecological change & social-economic change
		2. Data & Information
* Review national data stocktaking
* LULC from 1997 up to 2018 – GIS
* Participatory methods: for the timeline of resource changes & socio-economic changes over time in selected protected areas (case of: Virachey national park, Preylang wildlife sanctuary, Sambor wildlife Sanctuary, Cardamom protected areas, Peam Krasaob wildlife sanctuary)
* Interviews & meeting with local stakeholders and expert experience in Cambodia ecological management
	1. **Status, trends, and future dynamics of direct drivers of biodiversity and ecosystem services**
		1. Direct natural drivers
			1. Natural variability of climate and weather patterns
			2. Natural disasters and hazards
			3. Forest fire
			4. Diseases (including COVID19) and Pests
		2. Direct anthropogenic drivers
			1. Habitat/ ecosystem fragmentation and conversion
				+ Land use patterns and land use ownership
				+ Resettlement development (housing and wetland conversion)
				+ Agricultural expansion and intensification
				+ Social & Economic Land Concession
				+ Infrastructure development (road, dam and transmission line construction)
			2. Climate Change and variability
				+ Changing rainfalls
				+ Drought
				+ Storms
			3. Overexploitation of Natural Resources
				+ Overharvesting timber, NTFPs, and grazing
				+ Overfishing
				+ Unsustainable & illegal hunting and wildlife trade
				+ Overharvested biomass (firewood and charcoal production)
			4. Invasive species alien species
				+ Invasive species found in ecosystems
				+ Diseases and pesticide control
				+ Genetic contamination
			5. Pollution
				+ Air pollution
				+ Water pollution
				+ Soil pollution
				+ Noise
		3. Interactions between direct drivers and cumulative impacts
	2. **Status, trends, and future dynamics of indirect drivers of biodiversity and ecosystem services**
		1. Population growth, migration and urbanisation
		2. Socioeconomic
		3. Institutional/legislative including governance and policies
		4. Technical and technologies factors
		5. Cultural and spiritual factors
		6. International trade and market demands

* 1. **Impacts of measures taken**
	2. **Conclusion**
		1. Key findings
		2. Emerging issues and opportunities
		3. Gaps and Challenges (limited financial, limited human capacities, COVID 19, not adequate data)
	3. **References**

**Chapter 5: Scenarios of current and future interactions between biodiversity, including ecosystem services and socioeconomic development and human well-beings\***

*(\*The detailed methodology and contents, including the scenario options will be developed based on the resultant finding in chapters 2, 3 and 4)*

**By: H.E. Dr. Chan Somaly, H.E. Mr. Meng Monyrak, Mr. Seng Rathea, Dr. KEO Piseth, (Dr. HAK Mao and Dr. HENG Chanthoeun), Dr. Chou Phanith**

**1. Introduction**

* 1. Rationale
	2. Definition of scenario

1.3 How scenarios are analyzed and selected for this NEA assessment

1.4 Why scenarios are important for plausible futures

**2. Possible scenarios for Cambodia NEA**

2.1 EXPLORING alternative futures by using exploratory (descriptive) scenarios;

* Depending on findings and assumptions of chapters 2, 3 and 4

2.2 INTERVENTION (Using target-seeking scenarios (normative scenarios));

* Depending on findings and assumptions of chapters 2, 3 and 4

2.3 INTERVENTION (Policy screening using ex-ante assessment);

* Depending on findings and assumptions of chapters 2, 3 and 4

2.4 POLICY EVALUATION using ex-post assessment.

* Depending on findings and assumptions of chapters 2, 3 and 4

**3. Advantages and disadvantages of each proposed scenarios**

3.1 How these scenarios are to shape the policy-making and decisions

**4. Conclusions**

**5. References**

**Chapter 6: Options for Policies, Governance and Institutional Arrangements for Biodiversity and Ecosystem Management\***

*(\*The details of this chapter will be modified and provided based on the resultant findings of chapters 2-5)*

**By: H.E. Dr. Chan Saruth, Mrs. Ken Bopreang, H.E. Dr. Yoeu Asikin, Ms. Soeun Chakriya, Ms. Vichuta LY**

|  |
| --- |
|  |

**1. Introduction**

1.1 Rationale

1.2 Analytical approach

1.3 Structure of the chapter

**2. Governance and institutional arrangements**

2.1 National, sub-national governments, civil society, and private sector

2.2 Local socio-political and cultural scenes

 2.2.1 Community participation

 2.2.2 Local and indigenous people and their rights

 2.2.3 Gender equity and women stewardships

 2.2.4 Youth participation

**3. Governance challenges and opportunities for viable options**

3.1 Changing governance systems and need for good resource governance

3.2 Existing policy and legislation related to natural resources management, sustainable uses of biodiversity and ecosystem services

3.3 Roles of drivers and potential policy pitfalls

3.4 Development pathways for emerging options

**4. Presentation of options**

4.1 Policy instruments

 4.1.1 Legal and regulatory instruments

4.1.2 Social and cultural instruments

4.1.3 Economic and financial instruments

4.1.4 IPLCs right-based approaches on natural resource management

4.1.5 Community-based management instruments

4.2 Governance options for improving biodiversity and ecosystem management

4.2.1 Expanding and improving governance of protected areas systems

4.2.2 Strengthening cooperation for transboundary governance

4.2.3 Mainstreaming biodiversity in relevant sectorial planning and implementation

4.2.4 Fair and equitable sharing of benefits

4.2.5 Investments in natural capital and advance technology (including PES, REDD+)

4.2.6 Environmental regulation, standards and certification

4.2.7 Other relevant governance options (including capacity building)

4.3 Possible options for decision-makers in response to drivers and scenarios

4.3.1 Decision frameworks for effective responses to biodiversity vs​ Development and climate change;

4.3.2 Decision making and biodiversity uncertainty.

**5. Conclusions and recommendations**

**6. References**

* 1. **Measures taken to address ~~drivers of~~ loss of biodiversity and ecosystem services**
		1. Establishment of protected areas
		2. Ecosystem restoration
		3. Recovery of wildlife
		4. Implementation of CITES
		5. Conducting proper EIA
		6. Policy and legislations